

# Vaping -

Use of Electronic Nicotine Delivery Systems (ENDS)

Katina Nicolacakis, MD

Associate Professor of Medicine

Cleveland Clinic Lerner College of Medicine

Respiratory Institute

August 22, 2020





# Objectives

- What are E-cigarettes?
- Facts about Nicotine
- Risks of E-cigarette use
- SARS-CoV-2

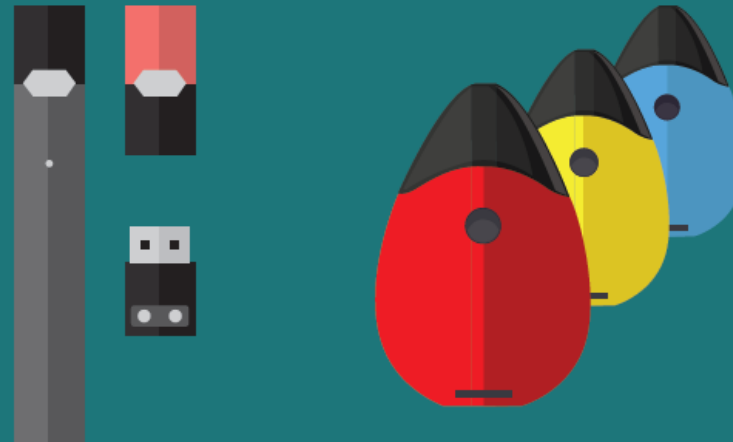


# Electronic cigarettes, e-cigs, or Vapes

Tanks & Mods



Rechargeable e-cigarette



Disposable e-cigarette





1<sup>st</sup> Gen  
Disposable  
E-cigarettes



2<sup>nd</sup> Gen  
E-cigarettes with  
prefilled or  
refillable cartridge



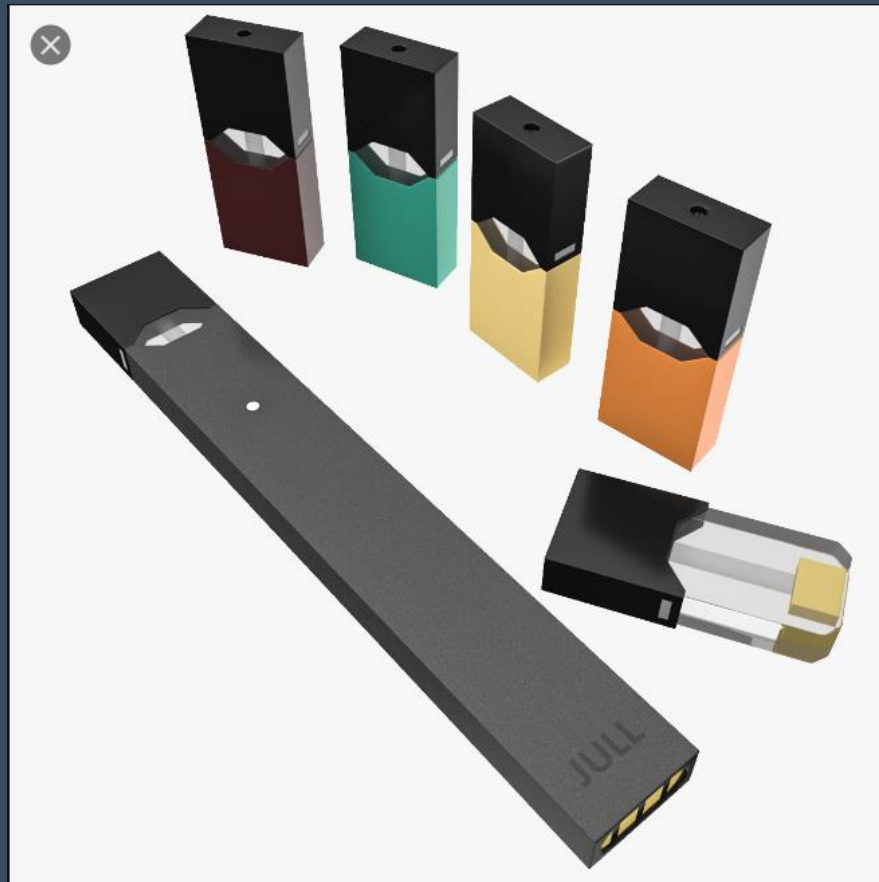
3<sup>rd</sup> Gen  
Tanks or  
Mods



4<sup>th</sup> Gen  
Pod  
Mods

# Electronic cigarettes

Battery powered devices that people use to heat liquid that produces an aerosol cloud of chemicals. Juul is one of the most popular brands of vapes.



**FACT:**  
99% of vapes  
contain nicotine

# Dabbing

Vaping marijuana by heating concentrated cannabis oil, called butane hash oil, with nicknames such as “honeycomb,” “budder” and “earwax.”



A process that allows the user to inhale a high concentration of THC by aerosolizing of a concentrate that has been placed on a hot surface - the “nail”

# Dripping with e-liquid or juice

- E-liquid is the fluid used in vaporizers and “dripped” directly onto a coil
- Mixture of water, flavoring and propylene glycol or vegetable glycerin
- Nicotine and/or THC can be present at different doses.



Why do you think people use e-cigarettes?



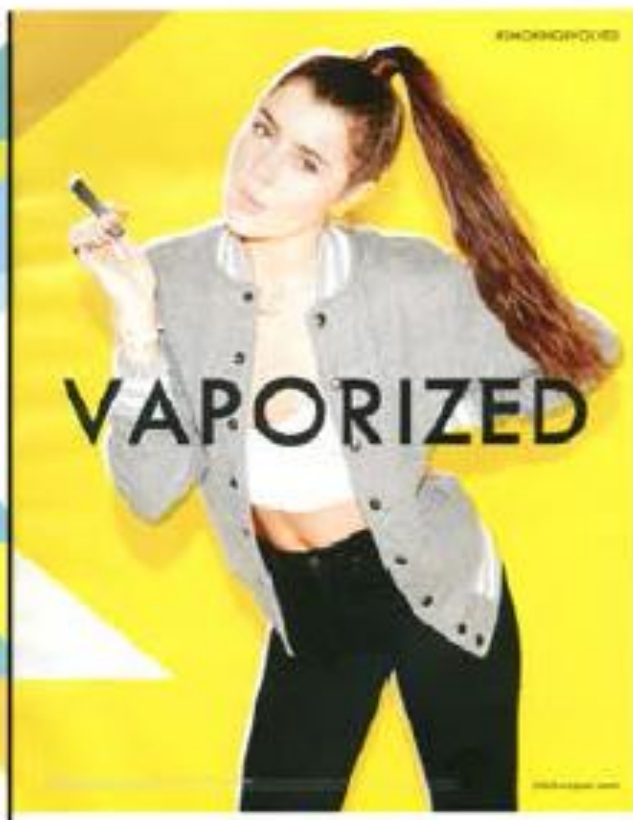




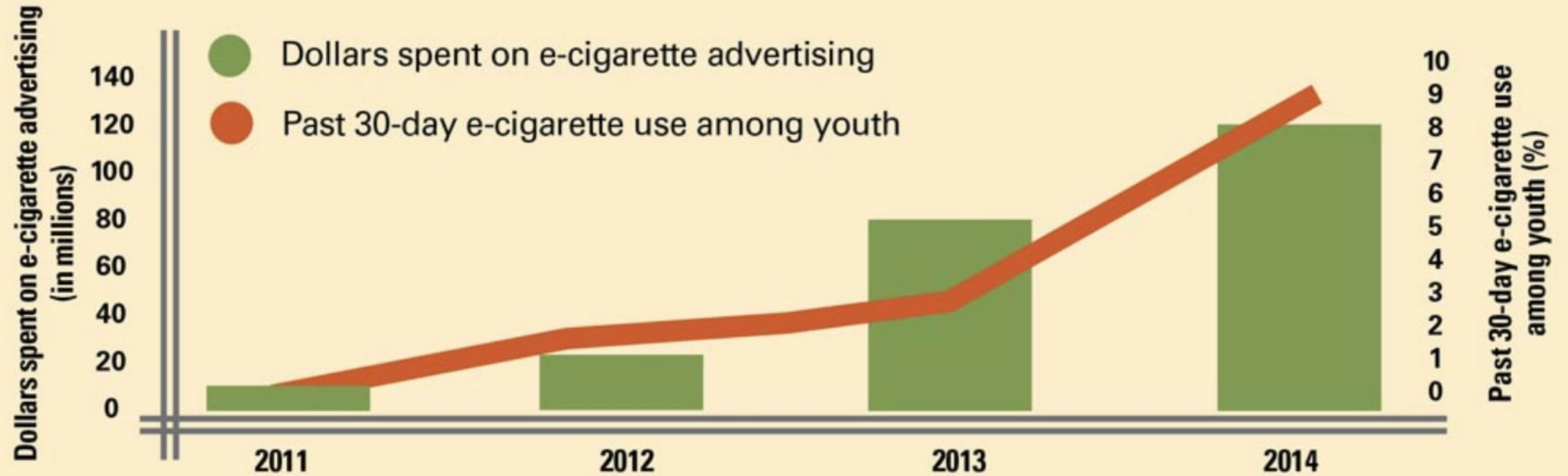
Virginia Slims



You've come a long way, baby.

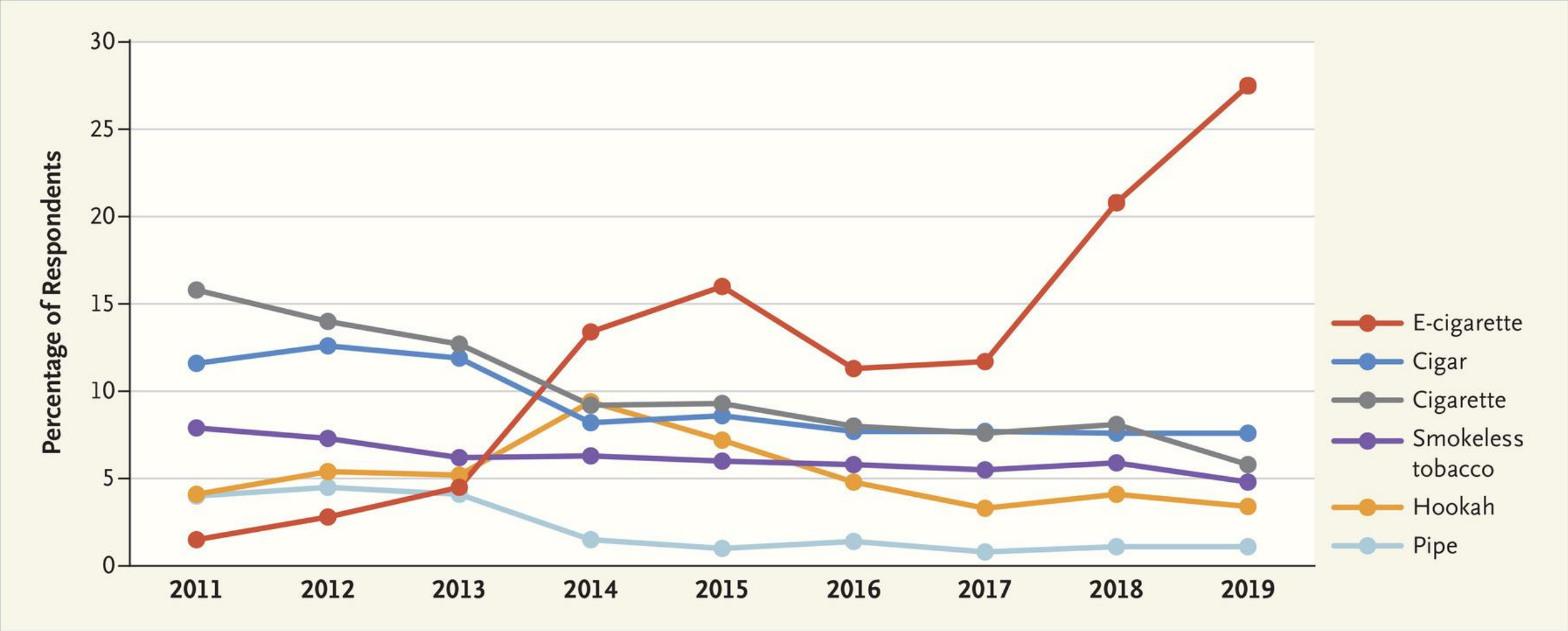


# E-cigarette use among youth is rising as e-cigarette advertising grows



SOURCE: National Youth Tobacco Survey, 2011-2014; Kim et al (2014), Truth Initiative (2015).

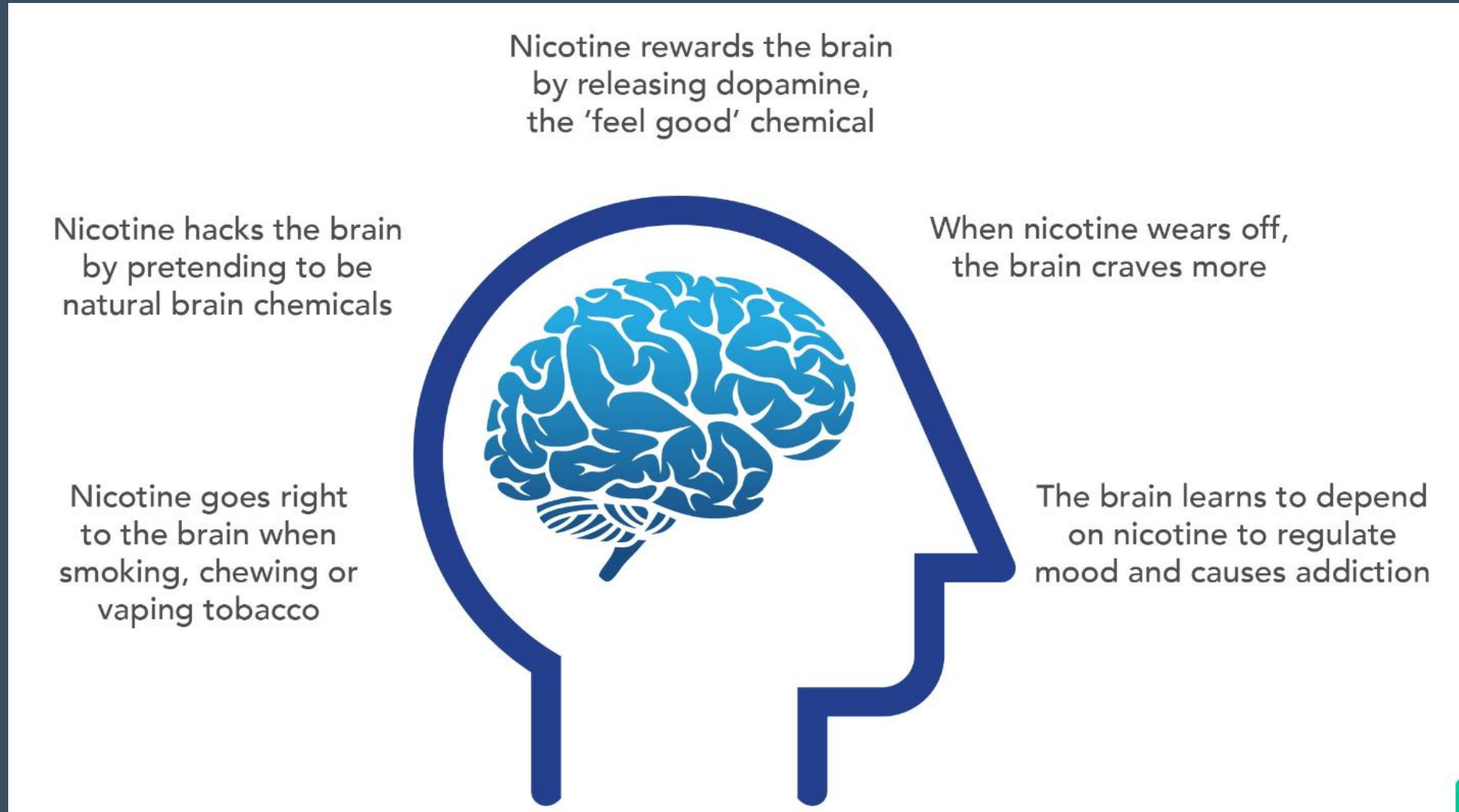
# Current Tobacco Product Use among U.S. High School Students, 2011 to 2019



# Legal age to buy Tobacco products

On December 20, 2019, the President signed legislation to amend the Federal Food, Drug, and Cosmetic Act, and raise the federal minimum age of sale of tobacco products from 18 to 21 years. It is now illegal for a retailer to sell any tobacco product – including cigarettes, cigars and e-cigarettes – to anyone under 21.

# FACT: Nicotine affects learning, memory and mood



# How much Nicotine is in each pod?



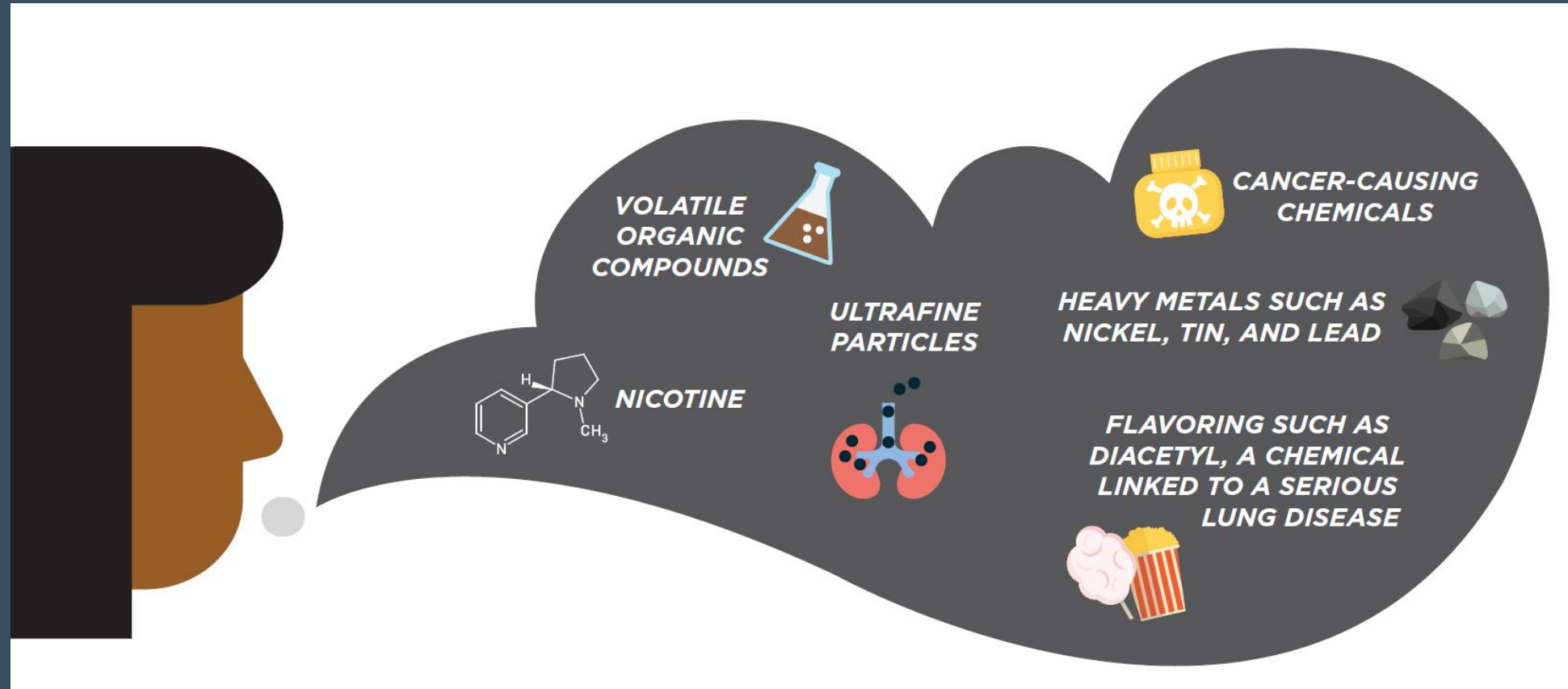
=



1 pack = 20  
cigarettes

1 pod (0.7ml) = 0 –  
50% = 50mg/ml

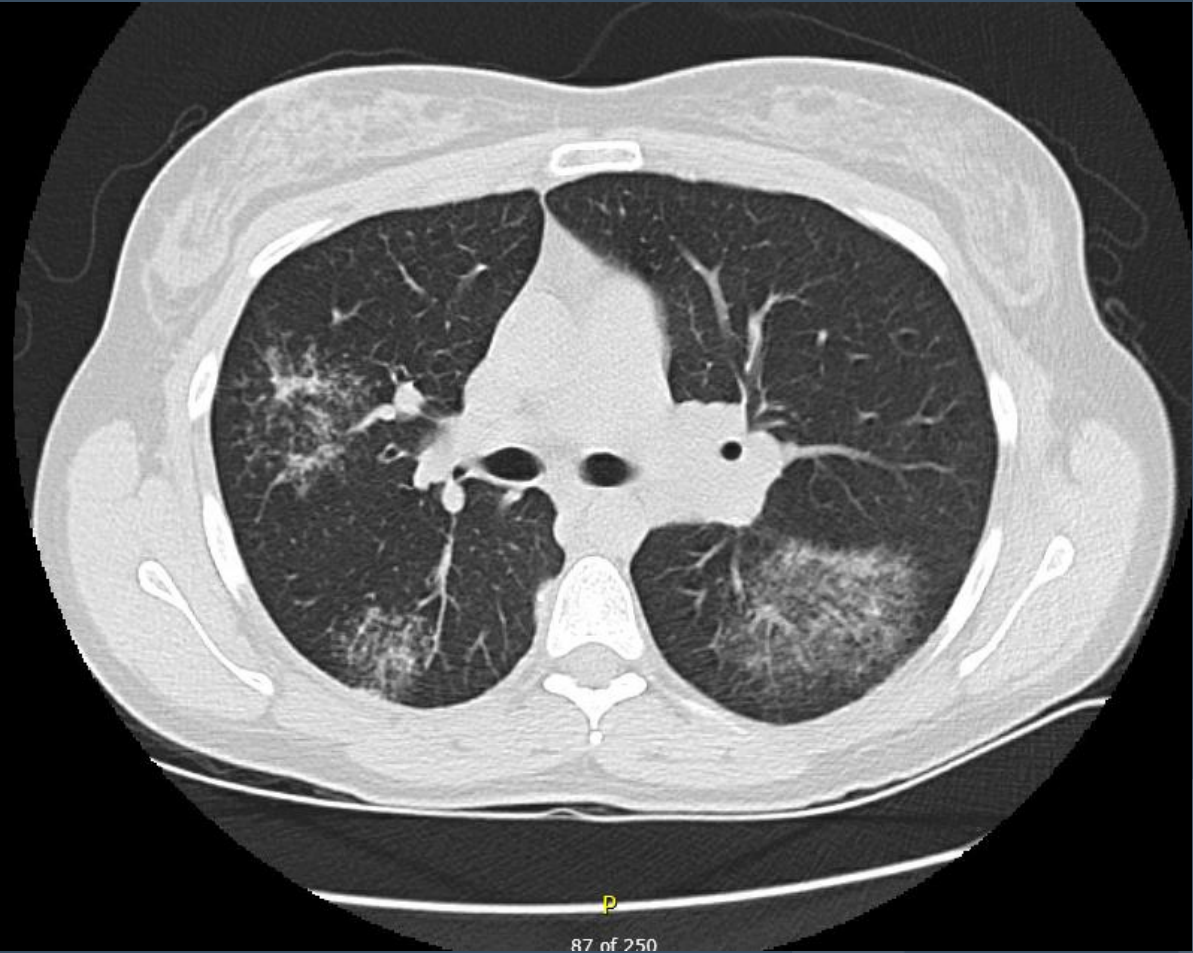
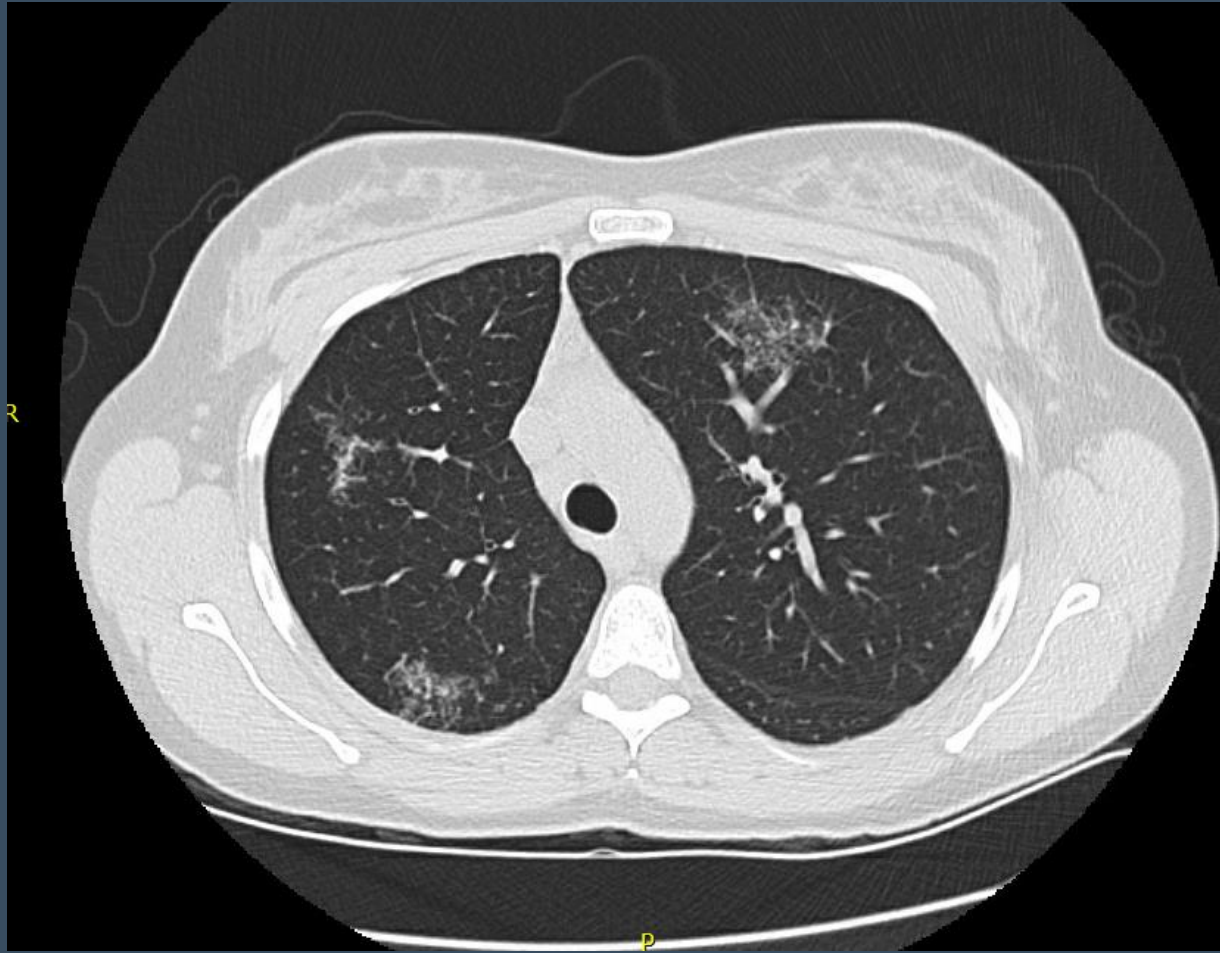
**FACT:** E-cigarettes contain harmful chemicals such as formaldehyde, which is known to cause cancer, and acrolein which is used as a weed killer and can cause irreversible lung damage.



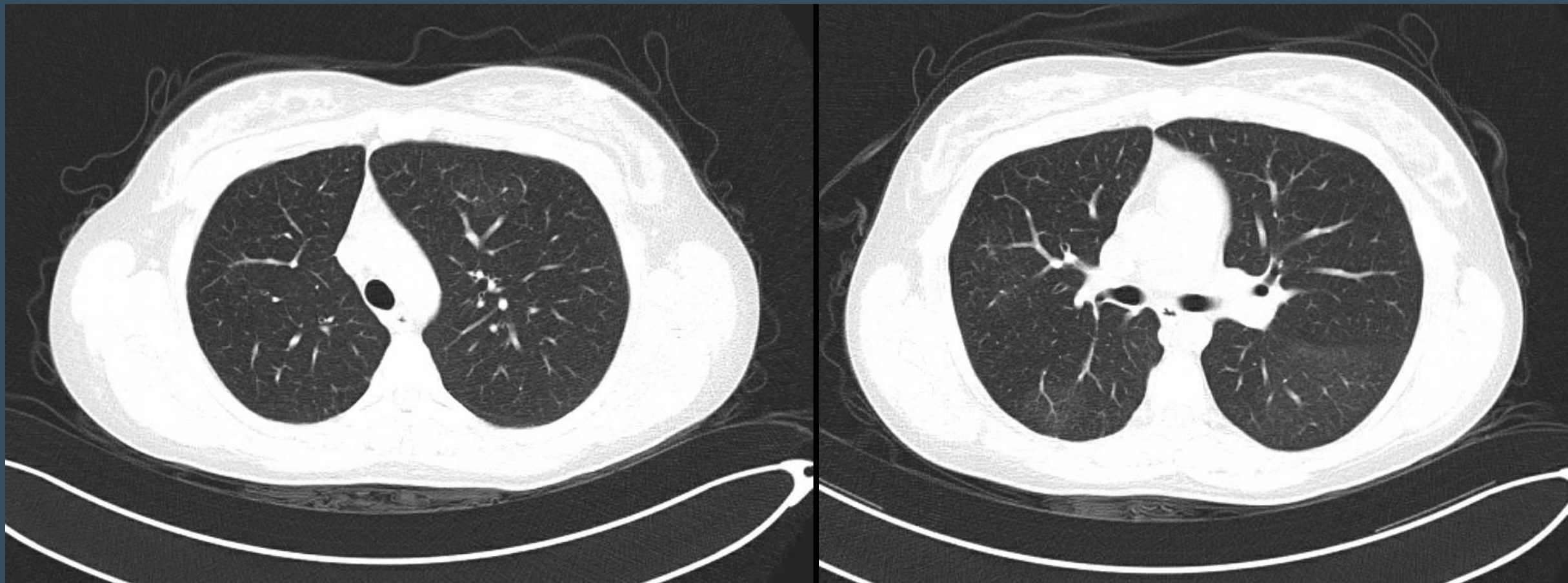


# What are the health risks of e-cigarettes?

- Nicotine addiction
- Impaired learning, concentration, memory
- Toxic to developing fetuses
- *Possible* long-term effects: COPD or emphysema, fibrosis, cancer, heart disease.
- Death
- *Possible* increased risk of infections – COVID-19
- ***Acute inflammation in the lungs***



3 months follow up



# EVALI

## E-cigarette, or vaping, product use-associated lung injury

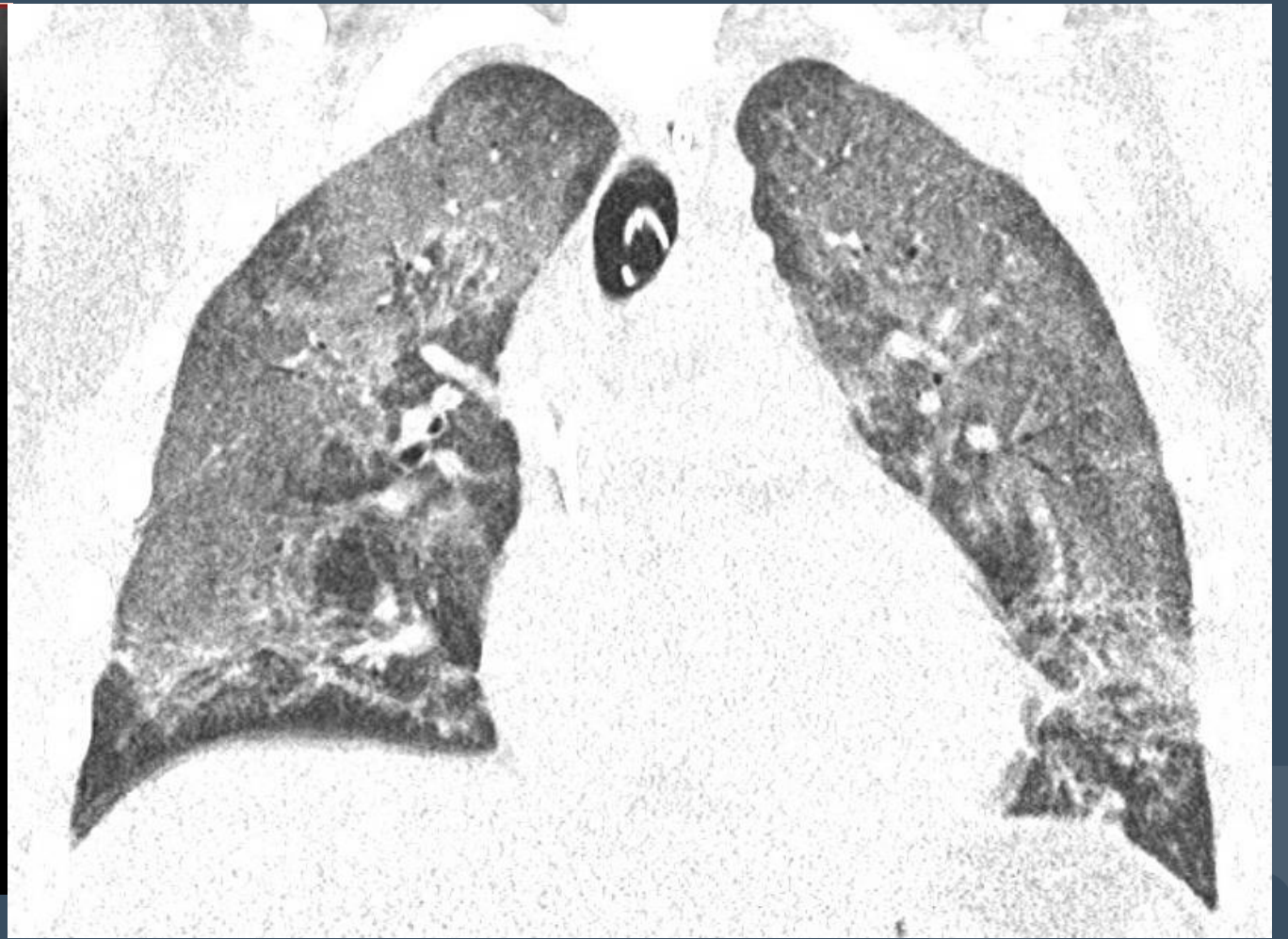
- What?
  - New lung injury and inflammation in 2019
  - Low oxygen levels
  - May lead to respiratory failure
- Who?
  - **2,807 cases** of hospitalized EVALI (all 50 states)
  - **68 deaths** have been confirmed in 29 states
  - Median age - 24 years and ranged from 13–85 years
- Why?
  - Vitamin E acetate - an additive in some THC-containing vaping products

# 2022 Hospitalized patients

- 82% reported using THC-containing products
- 33% reported exclusive use of THC-containing products
- 57% reported using nicotine-containing products
- 14% reported exclusive use of nicotine-containing products.

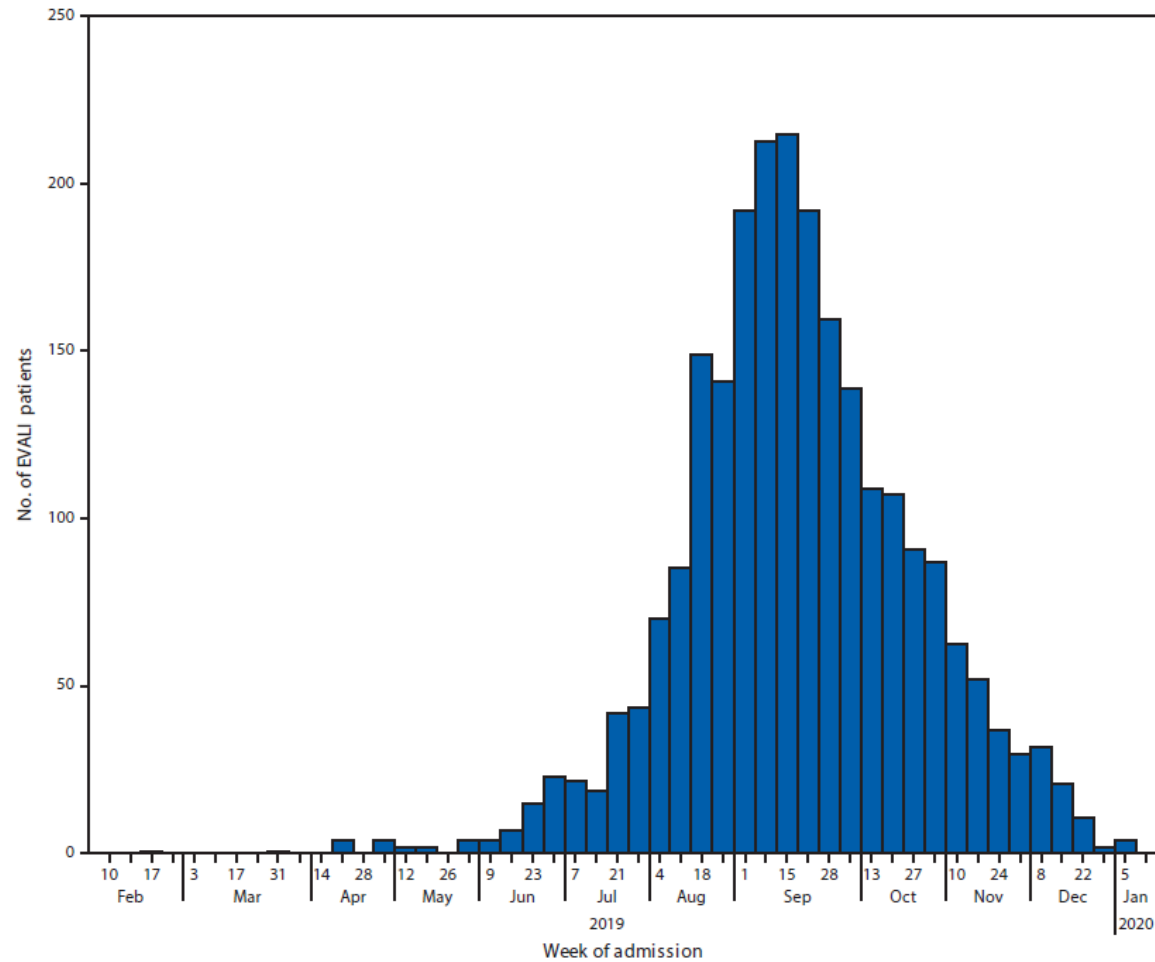
# EVALI patients who reported using THC-containing products

- 16% reported acquiring products only from commercial sources (recreational and/or medical dispensaries, vape or smoke shops, stores, and pop-up shops).
- 78% reported acquiring products only from informal sources (family/friends, dealers, online, or other sources).
- 6% reported acquiring products from both commercial and informal sources.



Emergency department (ED) visits related to e-cigarette, or vaping, products sharply increase in August 2019, peak in September 2019 and then decline.

FIGURE 1. Number of patients (N = 2,398) with e-cigarette, or vaping, product use–associated lung injury (EVALI) by week of hospital admission — United States, February 10, 2019–January 14, 2020

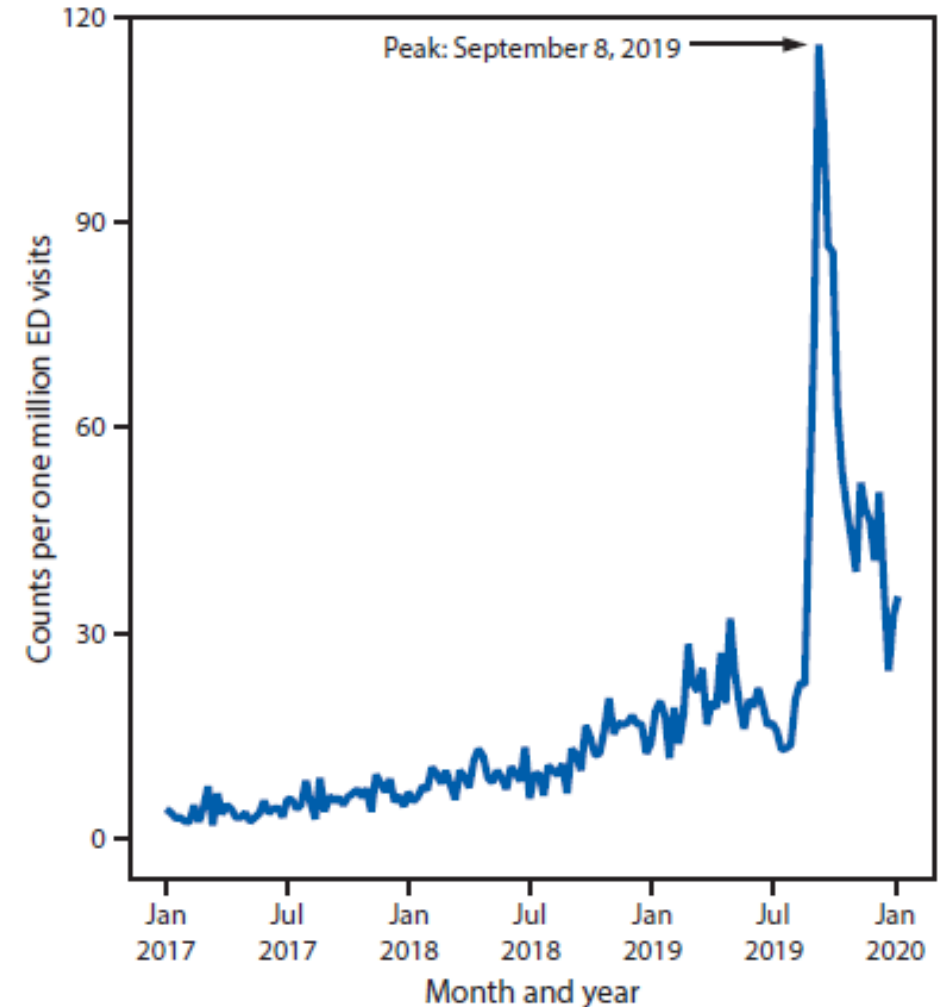




# Emergency Department Visit declining numbers may be related to the following:

- Increased public awareness of the risk associated with THC-containing e-cigarette, or vaping, product use as a result of the rapid public health response.
- Removal of vitamin E acetate from some products.
- Law enforcement actions related to illicit products.

FIGURE 2. Emergency department (ED) visits with e-cigarette, or vaping, product use in the reason for visit (chief complaint)\* — National Syndromic Surveillance Program, United States, January 1, 2017–January 11, 2020



# How is Vitamin E harmful to the lungs?

- Vitamin E acetate is commonly used as a dietary supplement and in skin creams.
- Heating Vitamin E acetate in these devices may create chemical called ketene
- Ketene compound that has the potential to be a lung irritant, depending on concentration.
- **Basically, you should not be inhaling heated Vitamin E**

# Are e-cigarettes safer than cigarettes?

- Levels of certain toxicants are lower in e-cigarette users than in smokers
  - Nitrosamine N nitrosonornicotine
  - Carbon monoxide
  - Nicotine derived nitrosamine ketone (4-(methylnitrosamino)-1-(3-pyridyl)-1-butano
- Suggests a reduced harm from toxicant exposure if smokers switch to e-cigarettes.

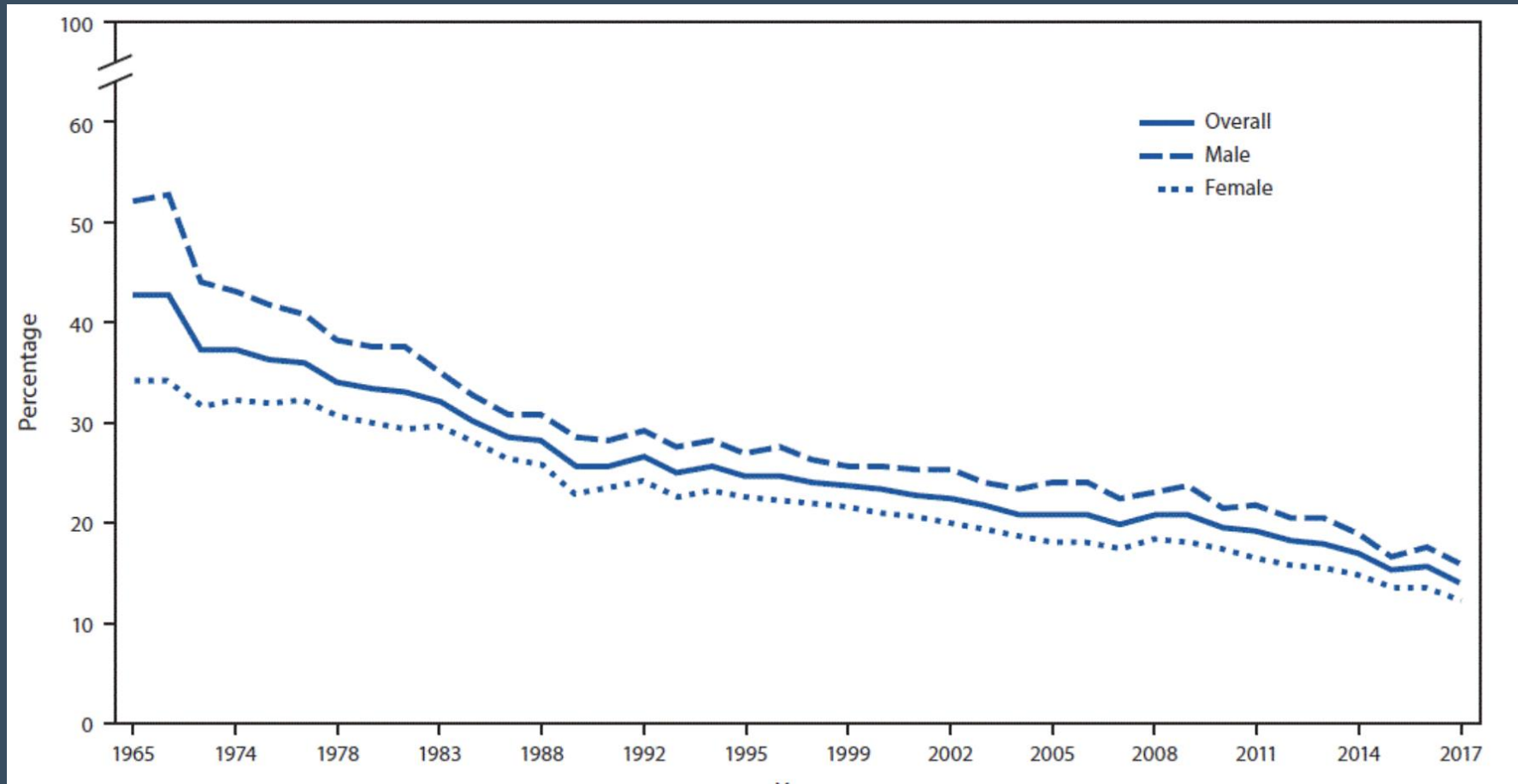
# Are e-cigarettes less harmful?

- Randomized control trial - UK
- 886 participants: (NRT) nicotine replacement therapy product of choice x 3 months vs e-cigarette pack w/ nicotine 18mg/day
- Among participants with 1 year-abstinence
- 80% of those in the e-cigarette group were still vaping at 12 months
- 9% of the NRT group were still using NRT

# E-cigarettes as a smoking cessation aid ?

- Not approved by the FDA for smoking cessation
- U.S. Preventive Services Task Force
  - Evidence is “insufficient” to recommend e-cigarettes for smoking cessation in adults, including pregnant women
- May help non-pregnant adult smokers if used as a complete substitute for all cigarettes and other smoked tobacco products

# Percentage of adults aged $\geq 18$ years who were current cigarette smokers National Health Interview Survey (NHIS), United States, 1965–2017



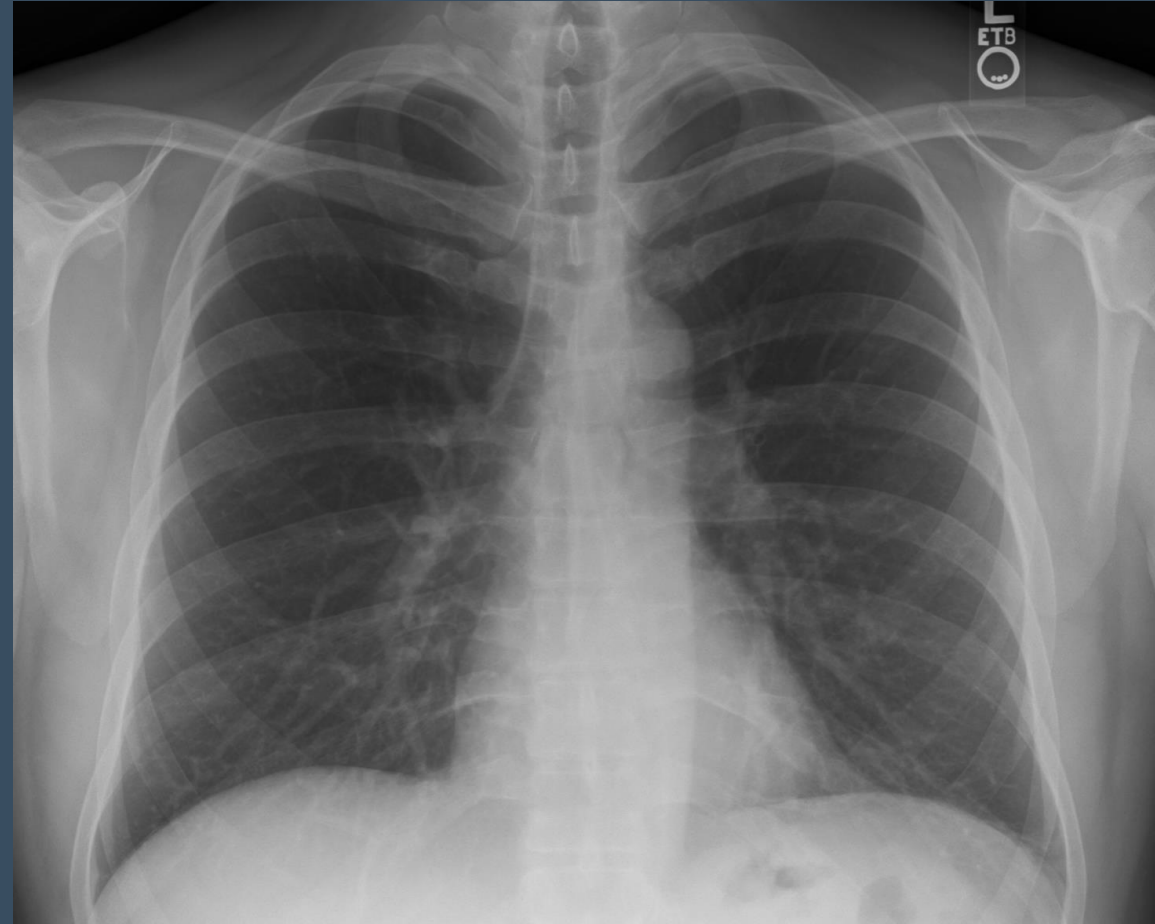
In 2017:

- 47.4 Million adults used any tobacco product
- 41.1 M (87%) smoked cigarettes
- 9M (19% used 2 or more tobacco products)

# Is Vaping a Gateway to Cigarette Smoking?

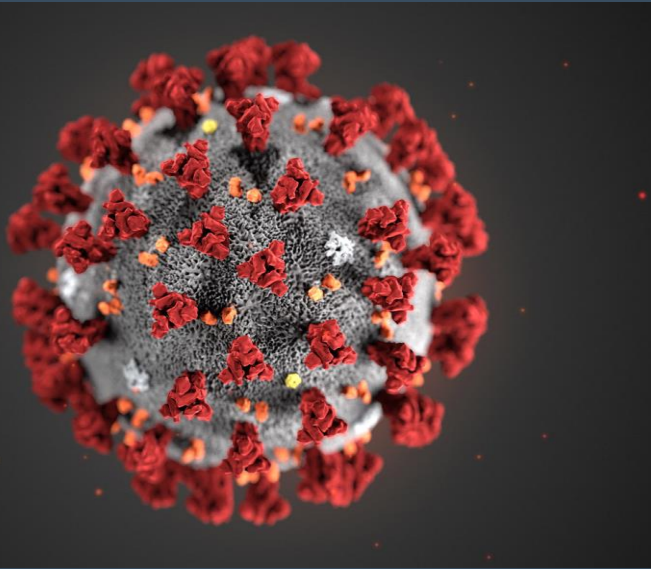
- Gateway effect: What is the effect of e-cigarettes promoting the uptake of tobacco cigarettes among nonsmokers?
- A meta-analysis of **9 studies containing data from 17,389 adolescents and young adults** showed that e-cigarette use was associated with an increased risk of subsequent initiation of tobacco smoking
- Ages between 14-30 years followed for 6-18 months
- The probability of Cigarette smoking initiation
  - **23.2%** in those who had **ever used e-cigarettes**
  - **7.2%** in those who had **never use e-cigarettes.**

# Vaping related lung injury





# E-cigarettes and Coronavirus SARS-CoV-2



- Smokers are at increased risk of respiratory infections, pneumonia and influenza
- Smoking and vaping are risk factors for more severe COVID-19 complications
- Nicotine may enhance SARS-CoV-2 infection
- EVALI and COVID-19 signs and symptoms can be similar (cough, fever, diarrhea)
- EVALI and COVID-19 pneumonia and respiratory failure may be difficult to distinguish
- More data and study is needed to gain a better understanding

# In Conclusion

- E-cigarettes contain nicotine
- Nicotine is highly addictive to developing brains. Young brains are developing till about 25 years old
- Nicotine interferes with learning, attention and memory
- Nicotine is toxic to developing fetuses
- Nicotine addiction early in life makes it easier to become addicted to other drugs like cocaine and methamphetamines
- Teens who use e-cigarettes are more likely to smoke cigarettes

# In Conclusion

- E-cigarettes create an aerosol of chemicals, not a water vapor
- It is unclear if e-cigarettes are useful to reduce harm in current smokers
- Nicotine appears to increase susceptibility to respiratory infections, including perhaps SARS-CoV-2
- Not FDA approved for smoking cessation
- Potential long-term harms require further investigation
- E-cigarettes are a public health concern

# Information

- QuitSTART app
- Teen.smokefree.gov
- Text QUIT to 47848
  
- [https://www.cdc.gov/tobacco/basic\\_information/e-cigarettes/index.htm](https://www.cdc.gov/tobacco/basic_information/e-cigarettes/index.htm)
- <https://www.fda.gov/tobacco-products/youth-and-tobacco/fda-launches-new-campaign-real-cost-youth-e-cigarette-prevention-campaign>



Thank you!

